

Choreographing the Brain Friendly Classroom

Presenter Jennifer Morris



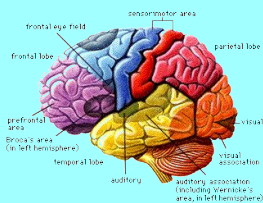
Symbols Represent Ideas



$$(n \times a)/(n \times b)$$

Fast Facts

- Your brain weighs about 3 pounds
- 70 degrees is the ideal temperature for learning
- Brain is 78% water
- Designed to learn by mistakes/misconceptions
- Works best with 25 grams of glucose in the bloodstream
- On average the human brain has 86 billion neurons
- The more intense an emotional state, the more intense the learning
- Students in table groups ask more questions



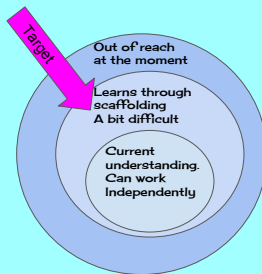
The Instructional Dance

Emotionally Safe Environment
Brain Body Movement Connection
Relevancy and Choice
Collaboration
Specific Assessment and Feedback
Challenge and Enrichment
Visuals
States and Novelty

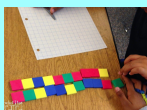


Scaffolding Zone of Proximal Learning

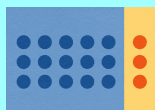
Connect to prior knowledge
Entry activities
Exploration/Inquiry
Use visual aids
Chunk up the learning
Give time to talk
Encourage mathematical discussion



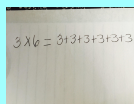
Concrete to Semi-Concrete to Abstract



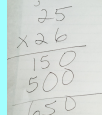
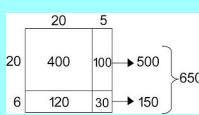
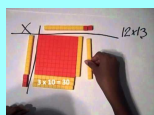
Concrete



Pictorial



Abstract



Relevancy

Teaching Model

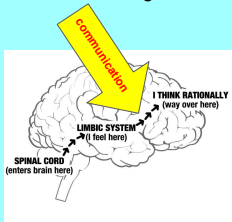
1. State the Key Focus - Multiplication or Volume
2. Show the picture.
3. Students generate questions about the picture.
4. Present the task.
5. Have students estimate an answer. Too high. Too low.
6. Have students collaborate on how they can solve the problem.
7. End with a mathematical discussion.

Soda Display



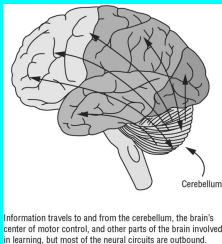
Motivation

➤ Emotional Intelligence



- Growth mindset
- Belief in effort
- Punished by rewards
- Basic needs
- Self-efficacy

The Movement and Cognition Connection



Information travels to and from the cerebellum, the brain's center of motor control, and other parts of the brain involved in learning, but most of the neural circuits are outboard.

Image borrowed from *Teaching with the Brain in Mind, 2nd Edition*

- Exercise strengthens our brains
- fMRIs show strong relationships between movement and language systems, movement and memory, and movement and attention.
- We learn to predict (think about) our movements before we execute them (move) so that we control them better (Flanagan, Vetter, Johansson, & Wolpert, 2003).

Movement

- Increase blood flow and oxygen to the brain
 - Cerebellum operates at a higher capacity at times of movement
 - The body is designed to learn through movement
 - Movement in terms of changing locations can also cause a marked improvement in memory.
- ☐ Place Value Jump
 - ☐ Adding rhythmic movement intensely displays the counting pattern for the students
 - ☐ Human Numberlines
 - ☐ Number Line Decimal Match
 - ☐ Use Clipboards to take quizzes around the room
 - ☐ Four Corners
 - ☐ Tally Mark Walk



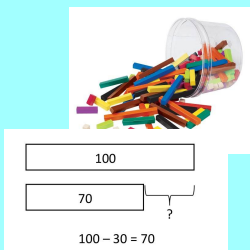
Visualizing

- Long before children can read they are able to use visuals for information.
- They understand that lines, shapes, forms, and colors have meaning



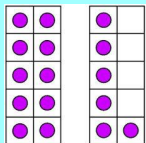
Visual Learning Content

- Manipulatives
 - Diagrams
 - Build Models
 - Draw and Sketch
 - Retrieve Experiences
 - Mental Images
- “see” math concepts in the “mind’s eye”

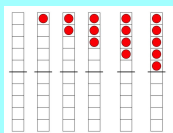


Progression of Visual Models

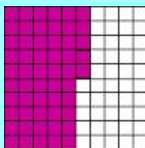
Ten
Frames



Ten
Strips

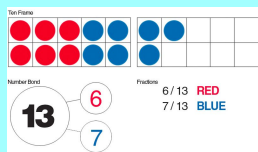


Hundred
Grid



Visuals

Combo Images



Number Lines

- Supports informal thinking strategies
- Allows students to partition and subdivide - 0 to 1...0 to 100
- Effectively shows distance
- Human number lines

Discovering Factors Visually Sample Lesson

➤ CCSS 4.OA-4

Gain familiarity with factors and multiple

Find all factor pairs for a whole number in the range 1–100 and recognize that a whole number is a multiple of each of its factors.

➤ CCSS Mathematical Practice Standard Model with mathematics

They can apply the mathematics they know to solve problems



Sample Lesson Prior Knowledge

- We built arrays with different materials



- Used tiles to show multiples



Building Arrays of 12

- Use your 1 inch tiles to build an array of 12.
- How many arrays can you build?
- Be prepared to share your findings.

Think Pair Pod Share



- What do you notice about the quadrilaterals we built?

What are the factors of 12?

Arrays

Factors

1, 2, 3, 4, 6, 12

What are the factors of 15, 16, 21?

- Record your findings in your math journal using pictorials, numbers and words.
- Be prepared to share your findings

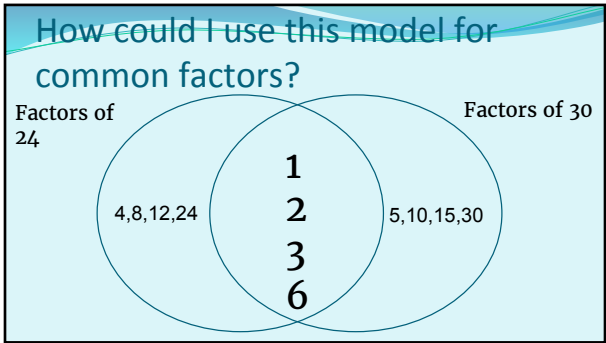
Extras

Number	Factors
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Factoring Exemplar

Name: _____

Using your tiles, make a prime factor tree for the number 18. Use pictures, numbers and words to explain how you solved the problem.



Collaborate

How could you use this model to teach prime and composite?

Tiered Tasks

Tiered Geometry

- Match the geometric shape cards to the geometric word cards and record your answers.
- Compare and contrast two of the geometric shapes in the basket.
- Examine four geometric shapes from the basket. Label and record how many vertices, sides and faces each shape has.

Each student receives directions for ONE tier only. This is not a product menu.

Webb's Depth of Knowledge

A pyramid diagram with four levels, each represented by a colored ring. The levels are labeled as follows: Level Four (top, green ring) - Using extended thinking to synthesize information or apply it to real-world applications; Level Three (yellow ring) - Employing strategic thinking through the use of reasoning or decision making; Level Two (red ring) - Conceptual knowledge, or the ability to put facts in context; Level One (bottom, purple ring) - The ability to recall facts.

Reflection

- Metacognition
 - visualization of the problem
 - think pair share
 - number talks
- Peer reflection
 - analyzing and editing
- Addressing misconceptions
- Sharing study habits



Resources

<http://www.edutopia.org/blog/strategies-getting-keeping-brains-attention-donna-wilson-marcus-conyers>

<http://www.hwdsb.on.ca/ancasterhigh/files/2010/10/The-Brain-Compatible-Classroom.-Using-What-We-Know-About-Learning-to-Improve-Teaching.pdf>

Jensen, Eric. *Teaching with the Brain in Mind, 2Nd Edition*. Alexandria, VA: ASCD, 2005. Print.

Gregory, Gayle, and Martha Kaufeldt. *The Motivated Brain: Improving Student Attention, Engagement, and Perseverance*. Alexandria, VA: ASCD, 2015. Print.

<http://www.livescience.com/3186-brain-food-eat-smart.html>

Strongly Disagree 0	Disagree 1	Agree 2	Strongly Agree 3
Send your text message to this Phone Number: 37607			
Engaging and effective			
<u>11834</u>			<u>Comments</u>
Well-prepared and knowledgeable	Session matched description		
Example:	11834	323	Inspiring, good content
Non-Example:	11834	3 2 3	Inspiring, good content
Non-Example:	11834	3-2-3	Inspiring, good

